

Current and Future Computational Challenges in PJM Markets

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PJM Interconnection
October 6, 2021
ARPA-E Conference

- Computational Challenge Caused by
 - Market Rules
 - PJM's Multi-schedule Model
 - Inability of solver to solve large optimization problem faster.
 - Hardware
- MIP Gap
 - Challenge to come up with specified MIP Gap percentage under stressed system condition such as Hot Weather and Cold Weather alert conditions.
 - 1% MIP Gap for 1M obj. function value vs 10M provides different results for smaller resources with different accuracies.

- Pump Storage Hydro Optimization
 - Large size unit in congestion sensitive area may cause poor quality solution in certain system condition.
 - Requires lot of computational time to get high quality solution.
- Combined Cycle Modeling
 - PJM has around 100 combined cycle units in operation.
 - A typical Combined Cycle unit is 2x1 configuration plant which has at least 3 operating configuration.
 - Expecting a major performance challenge with these many units along with PJM's multi-schedule model.

- Distributed Energy Resource Participation (DER)
 - Commitment of larger number of smaller size DERs may be a challenge from timing perspective.
 - In order to get better commitment results for these type of resources, MIP gap may need to be reduced.
- Shorter Time Periods
 - The sub-hourly time step for Day-Ahead Market may be important in future with increasing role of ancillary services and renewables.
 - Can current SCUC solver handle this?

- Reserve Requirements
 - Multiple reserve products increases the dimension of optimization problem and hence degrade solver performance.
 - Downward sloping demand curve further increase problem dimensions and solution time.
- SCUC- SFT Iterations
 - Not currently utilized due to non-predictable solution time in GE software.
 - Essential to get faster results and to reduce number of cases for Day-Ahead Market.